

AMENDMENTS TO THE SPECIFICATION

At page 1, just before “Background of the Invention,” please insert the following new paragraph:

This application is a continuation of U.S. patent application 10/100,450, filed March 14, 2002, entitled “METHODS AND APPARATUS FOR RESISTANCE VARIABLE MATERIAL CELLS,” which is hereby incorporated by reference herein in its entirety.

Please replace the appropriate paragraphs of the specification with the respective amended paragraphs presented below:

[0006] In addition, Mitkova, et al., found that glasses that fall within the stoichiometry range defined by region II of Figure 1 of the Mitkova reference do not form silver selenide when doped with silver (Ag). For example, a rigid glass, such as germanium selenide ($\text{Ge}_{0.40}\text{Se}_{0.60}$) will not form silver selenide when photodoped with silver (Ag) and, as a result, does not function as a memory switch.

[0007] The presence of silver selenide in a $\text{Ge}_x\text{Se}_{1-x}$ glass photodoped with silver (Ag) allows the glass to be used as a memory switch. Glasses used for silver (Ag) incorporation via photodoping are floppy and switch more slowly electrically, and with worse memory retention, than glasses that are rigid. Preferred rigid glasses, e.g., $\text{Ge}_{0.40}\text{Se}_{0.60}$, do not form silver selenide when photodoped with silver (Ag). However,

the relatively fast switching times and relatively good memory retention occur in a system which incorporates silver selenide and a rigid glass such as $\text{Ge}_{0.40}\text{Se}_{0.60}$. What is needed is a technique to form this type of memory cell.

[0009] Advantageously, embodiments of the present invention can be fabricated with relatively wide ranges for the thicknesses of silver chalcogenide and glass layers. Thus, memory cells can be fabricated without the relatively precise control of silver (Ag) and glass thicknesses that are necessary in a conventional photodoping process to maintain an appropriate amount of silver (Ag) in the glass without inducing crystallization in the memory cell. In addition, embodiments of the present invention can advantageously form memory cells on rigid glasses, such as $\text{Ge}_{0.40}\text{Se}_{0.60}$, which would normally incorporate silver (Ag) into the glass backbone making it unavailable for memory switching. These glasses have an additional advantage of having higher glass transition temperatures.

[0012] Another embodiment according to the present invention includes a memory cell with a layer of silver (Ag), a layer of chalcogenide glass, such as germanium selenide ($\text{Ge}_x\text{Se}_{(1-x)}$), and a layer of silver selenide disposed between two electrodes. In one embodiment, the layers are arranged such that the chalcogenide glass is disposed between the layer of silver (Ag) and the layer of silver selenide. The chalcogenide glass can be selected from a variety of glasses such as $\text{Ge}_{0.40}\text{Se}_{0.60}$ and $\text{Ge}_{0.25}\text{Se}_{0.75}$. In one embodiment, the silver selenide is slightly poor in silver (Ag) and the presence of silver (Ag) in the silver (Ag) layer allows the memory cell to function as intended.

[0033] The process forms 130 a layer of a chalcogenide glass. For example, the chalcogenide glass can be germanium selenide ($\text{Ge}_x\text{Se}_{(1-x)}$), arsenic selenide (As_2Se_3), and the like. Preferably, the chalcogenide glass formed is germanium selenide ($\text{Ge}_x\text{Se}_{(1-x)}$). In one embodiment, x is in a range of about 0.2 to about 0.43. An exemplary chalcogenide glass is $\text{Ge}_{0.40}\text{Se}_{0.60}$.

[0034] Preferably, the process forms 120 the silver selenide layer, and the process forms 130 the layer of germanium selenide ($\text{Ge}_x\text{Se}_{(1-x)}$) such that the silver selenide layer is between about 300 to 1000 Angstroms (\AA) thick, and such that the germanium selenide ($\text{Ge}_x\text{Se}_{(1-x)}$) layer is between about 200 to 1000 \AA thick. In one embodiment, the silver selenide layer is about 400 \AA thick, and the germanium selenide ($\text{Ge}_x\text{Se}_{(1-x)}$) layer is a layer of $\text{Ge}_{0.40}\text{Se}_{0.60}$ that is about 250 \AA thick.